

EXHIBIT A -- STATEMENT OF WORK

FOR

CONSOLIDATED INFORMATION TECHNOLOGY SERVICES II

(CONITS II)

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1. INTRODUCTION

The NASA Langley Research Center (LaRC) in Hampton, VA, has been instrumental in shaping aerospace history for more than eight decades. Established in 1917 as the first national civil aeronautics laboratory, LaRC has become a comprehensive, world-class center for aeronautics, earth science, space technology, and structures and materials research. Further information on the LaRC mission and its contribution to the NASA vision can be obtained from the web site <http://www.larc.nasa.gov>.

To accomplish its mission, the Center depends heavily on state-of-the-art information technology (IT), embracing computer systems ranging from laptop and desktop personal computers to super-computers; network systems ranging from building-dedicated through Center-wide; data storage facilities ranging from diskettes to massive, centrally accessed tape storage systems; and all of the associated operating, input/output, data transfer, data management, and data analysis systems.

The Center relies heavily on contractors to provide IT services. Two contracts provide most of the IT services to the Center: The Outsourcing Desktop Initiative for NASA (ODIN) Contract for the provision of desktop computing, networking, and telecommunications capability at the Center, and the Consolidated Information Technology Services II (CONITS II) Task Order to provide services that are not covered by ODIN. The Research Operations, Maintenance & Engineering (ROME) Contract provides IT services to most of the Center wind tunnels.

In general, the ODIN contract provides a broad range of general-purpose desktop computing support services including system administration, hardware and software maintenance, and help desk assistance. The ODIN approach is designed to offer a comprehensive, end-to-end desktop service for those systems that are considered to be fully functional and mature and in providing an operational system that is stable. Currently the Center is in the process of increasing the number of systems that will be covered by ODIN, with the goal of improving hardware/software configuration and patch management, improving IT security, and aligning Agency practices with OMB directives and Executive guidance. ODIN will be the default provider of desktop IT services for the majority of LaRC IT systems. The CONITS II Task Order, on the other hand, provides computing support services (including system administration and hardware and software maintenance) for systems that are either uniquely configured or highly specialized in function and that are not providing office automation services for end users. The CONITS II services typically involve a wide range of support functions including those for non-standard operating systems, system interfaces, or for use within a dynamic environment such as a research laboratory or test facility. The CONITS II Task Order provides system administration as a component of integrated support. Integrated support encompasses all activities necessary to develop, deploy, upgrade, operate, and maintain a production system which delivers an IT capability.

2. SCOPE

CONITS II will include a broad scope of IT services including new and emerging technologies that will evolve over the life of the contract. The scope of support to be provided under this Task Order is intended to cover IT requirements in support of computers, ancillary equipment, software, firmware, services, and related resources.

CONITS II services are divided into the following categories:

- General IT Support Services
- Systems and Applications Development Services
- Work Area Specific Services

General IT Support Services include, but are not limited to, systems administration, systems maintenance, database administration, and customer support. Section 4 more fully describes the requirements of this category of work.

Systems and Application Development Services embrace new software and modifications to existing software (other than those required for maintenance). Section 5 more fully describes the requirements for this category of work.

Work-Area Specific Services are similar in scope to General IT Support Services, but are specialized to particular work areas that are included in the CONITS II effort. Section 6 more fully describes the requirements of this category of work.

Specific work requirements for CONITS II will be furnished by the Government through the issuance of Task Assignments (TA). Technical performance standards and metrics will be provided in the TA.

Software development, operations, and maintenance under CONITS II apply to software at several levels of risk and control from minimal to critical (as it relates to impact to the Government) that will be specified by the Government in TAs.

The Contractor shall furnish all personnel, training, facilities, specialized equipment not provided as part of a TA, materials, and transportation necessary to perform these services. The Contractor shall establish an agreement with the LaRC ODIN contractor to provide all desktop computers and services. Any contractor-provided equipment connected to the LaRC network shall comply with NASA Procedures and Requirements (NPR) 2810.1A, Security of Information Technology. While the majority of work is directly in support of LaRC at the Center, other industry and government partners of LaRC are at times supported. This support may be provided at remote sites.

3. TASK ASSIGNMENT PROCEDURE

The Contractor shall provide IT services on an “as needed” basis in response to TAs issued by the Government. The general responsibilities and policies applicable to all TAs will be further defined in a TA to be issued at TO start.

TAs will be initiated by a NASA civil servant who will assume the responsibilities of the Task Area Monitor (TAM) and will provide the specific details of the scope, objectives, technical requirements, any Government furnished equipment or Government furnished information, and a schedule of milestones and deliverables, and funding for the task. Within 2 weeks (or as specified in the TA), the Contractor shall deliver an electronic task plan outlining the Contractor’s technical approach, staffing, and cost specifically detailing how the task plan meets the specific objectives, technical requirements and schedule of milestones and deliverables outlined by the government.. Following a review by the Government and negotiation with the Contractor, the LaRC Contracting Officer (CO) or designee will authorize the Contractor to begin the work.

3.1. Task Assignment Initiation

All TAs and related subtasks will be generated electronically by a NASA civil servant (TAM) and initiated with the concurrence of the COR, and may include the following information:

- Date of Initiation

- Title, Task Area Monitor (TAM), Org Code, Software Control Class, and Type of Task (required)

- Objective and Background Information

- Description of work to be performed (including all tasks, deliverables, and performance metrics)

Inventory of equipment and software with cross-reference to Section 4 requirements.
IT Security Plan number
CSO
Required milestones, deliverables, delivery dates, and period of performance
Required delivery date for the Task Plan
Acceptance criteria
Software class/control level for Section 5 requirements
Development approach (i.e., waterfall, spiral, evolutionary) for Section 5 requirements
Required software life cycle phases for Section 5 requirements
Requirements for installation, operations, or maintenance
Documentation requirements
Training requirements
Joint review requirements (including the requirement for the Contractor to document and distribute all joint review meetings and discussions and associated action item list)
Government estimated cost and fee
Government furnished items
Electronic approval/rejection and comments from the LaRC COR, TAM, Contractor PM, Business Manager, and Task Lead.

3.2. Amendments to the Task Assignment

In the case where the TA requires changes, the Government and Contractor shall arrive at a general agreement to the changes.

Changes that do not affect scope or cost shall be documented by the Contractor in the form of amendments to the Task Plan and must be reviewed and authorized by the TAM and COR.
Changes that affect scope or cost shall follow the same approval process as the original TA.

In the case of work out of scope of the CONITS II contract, the Contractor shall notify the COR in writing within 2 business days and shall not proceed with any work.

3.3. Electronic Task Assignment System

The Contractor shall establish, implement, and maintain a management control system required for planning, organizing, and controlling Task Order activities. The Contractor shall automate the task flow process as defined above in a manner that is compatible with the Center Information Architecture (see Section 5.3), i.e., a COTS task assignment system or one developed within the Center Information Architecture. This secure automated system shall allow for the electronic initiation, routing, review, approval, issuance, and modification of Task Assignments and related subtasks for the Government officials identified above in this section with initiation, editing, and re-routing by each approver as needed, and with automatic notification to the approvers of the need for approval. The Contractor shall track individual TA/Subtask estimated cost, funded cost and fee, cumulative Task Order Estimated cost and fee, and funding limitations. In addition, the Contractor's automated management system shall track the status of Task Assignments from planning to completion and record monthly projected and actual resources data for each Task Assignment with graphic, tabular, and narrative descriptions. The Contractor's tracking system shall also provide input data to the Task Order evaluation process by tracking each task assignment's performance metrics for proposal response, timeliness, costs, and other metrics required by the Government to track and score performance. These Task Assignment data shall be the same in-

formation that is in the monthly progress and financial reports required in Exhibit E, Task Order Documentation Requirements.

The Contractor electronic tracking system will be the intellectual property of the Contractor, but all data housed within will remain the property of the government. The Contractor will at the beginning of the contract provide to the government a data schema and data definition table for the application. Any changes throughout the contract performance period to the application will require a new data schema and data definition table. Also, at contract end, or at any point during the contract performance, the Contractor shall provide to the government a complete data file containing all task data for the period of performance in a file format compatible with either an Oracle database or standard relational database format.

4. GENERAL IT SUPPORT SERVICES

General support services are defined at a basic level as applicable to many TAs. The Contractor shall perform any or all of the functions stated in this section for systems that will be specified in TAs. A cross-reference will be provided in the TA indicating what functions of Section 4 will be required for each system in the inventory of equipment and software.

Services will be provided for a prime shift of 8 hours per day beginning no earlier than 7:00 a.m., Monday through Friday, except for Federal holidays and other days when the Center is closed. Where more rigorous requirements exist, they will be defined in TA's.

Software design, development and maintenance are indicative of services required of this contract. This type of activity could range from informational websites, web-based applications, stand-alone software, embedded software, and applications. This may or may not include database design, development and/or maintenance. Development in any of these areas must meet all current Agency guidance as well as industry best practices. All development should keep IT Security paramount throughout the application lifecycle. Industry best practices shall be followed in regard to lifecycle development including documentation and configuration management.

4.1. System Management/Administration

System management pertains to policy and procedures that may pertain to all TA's, such as configuration management and backup policy/procedures. System administration is more the hands-on operation, support, and maintenance of system hardware, software, and peripherals. System management/administration will pertain to most TA's but this list is not meant to be all-inclusive. Requirements include the following.

4.1.1. Configuration Management

Maintain a configuration management system (CMS) to track the equipment and software for all systems supported under task assignments. The CMS shall document standard configurations and processes for all systems related to the TA as well as any deviations to those standards. The Contractor shall update the CMS monthly to review any deviations in the processes and standard configurations and document those changes in the CMS.

Develop and maintain a historical configuration tracking log that identifies by date and time all changes, modifications, and upgrades that occur on systems supported on task assignments..

4.1.2. System Software and Hardware Upgrades/Enhancements

- a) Monitor user requirements and system performance. Monitor the availability of updates and upgrades to installed equipment and system software and the availability of new equipment and system software that would apply to the supported system. Participate in system reviews and recommend the installation of updates, upgrades, and new equipment and system software as appropriate.

- b) Plan for the installation of new or upgraded equipment and system software. This includes the consideration of cost, schedule, performance, power, environmental utilities, space limitations, networking, workflow, and the impact on other elements and users of the system. The Contractor shall include a set of reviews and written test procedures in accordance with industry best practices.
- c) Following Government approval and successful completion of all testing and reviews, install and verify the operability of new or upgraded equipment and system software. Minimize unavailability of system services.
- d) Recommend specific solutions and obtain quotes from appropriate suppliers.
- e) Inform all users of impacts from system upgrades and improvements a minimum of 2 weeks prior to any upgrades or system outages.

4.1.3. Operations

- a) Perform routine operations such as power up and shut down.
- b) Interface with equipment vendors or service providers for the maintenance of equipment and software where appropriate and outlined in the TA. Monitor the currency of maintenance contracts and software licenses and notify the TAM at least 6 months prior to any lapse in contract or license.
- c) Interface with network service providers for access to networks and to resolve problems associated with network access. All network connections shall follow Agency and local policy and guidance.
- d) Diagnose anomalies in the operation of equipment or system software. Provide timely fixes or work-arounds where possible. Report and document problems requiring correction. When necessary, interface with other IT service providers to resolve problems. Initiate corrective action. Follow up to ensure problem resolution. Response to problems during prime shift will be within 2 hours of notification or as specified in task assignments. Ensure all changes and resolutions are documented via the Configuration Management System.
- e) Backup and restore files to ensure reliability of system files. Create a backup plan, contingency plan and test procedures to be tested annually. Monitor the operation of the system and adjust the configuration and system parameters as necessary to maximize operational efficiency.
- f) Create and modify scripts that increase functionality or enhance system operation or performance and document in the CMS.
- g) Recommend operational improvements and implement them upon Government approval.

4.1.4. Documentation

Develop, deliver, and maintain the following documentation as a minimum:

- Baseline hardware and software configuration.
- Backup/Recovery procedures and test procedures.
- Access control procedures and authorization records.

Additional documentation may be defined in task assignments.

4.2. Hardware Maintenance

Hardware maintenance as defined in this section includes the repair and replacement of hardware components necessary to ensure operability of the covered equipment or to return the covered

equipment to a fully operational status. The covered equipment includes those items that are specifically identified in a TA. Services that shall be provided in satisfying the hardware maintenance requirements include:

- a) Diagnose problem or failure.
- b) Repair or replace failing components. Replacement parts shall meet or exceed Original Equipment manufacturer's standards.
- c) Verify and document that repair or replacement performs to manufacturer's standards.
- d) Verify and document that the performance of the system following the repair or replacement of failing components, meets or exceeds the performance of the system prior to system failure.
- e) Reload any files and/or data (if accessible) that are contained on a replaced or failing component before returning the system to operational status.
- f) Return any replaced components that contain classified data to the user.
- g) Based on current Agency guidelines and IT Security policy, cleanse (to ensure that data is fully erased and not retrievable or accessible by any means) any replaced data storage equipment that contains unclassified data prior to disposal or returning to the supplier, and maintain a documented log to indicate that this action was completed.

4.3. System Software Maintenance

System software maintenance as defined in this section includes the services required to ensure continuing operation of system software. All supported systems software will be licensed to the Government and will be specifically identified in a TA. Services that shall be provided in satisfying the software maintenance requirements include:

- a) Analyze software failure or performance degradation.
- b) Obtain software updates and upgrades from the vendor or public domain sources (if required in individual task assignments).
- c) Install software updates to ensure that system is operating at the most current IT Security posture.
- d) Verify system operation following software upgrades.
- e) Perform full system, file, and data backup prior to software upgrade.
- f) Preserve and/or restore all files and data during software upgrade.
- g) Ensure that any and all Agency required software is loaded and maintained, (i.e., Patch Management client software, etc.) if applicable to meet Agency guidance and policy.

4.4. Application Management

Application management is highly integrated with the management of system software, servers, associated system hardware, and overall system administration operations. Consistent proactive monitoring, system design, and tuning assure optimal resource utilization and performance.

The application software used in support of NASA LaRC missions, business processes, and specific IT functions range from high end commercial suites to open source packages to locally developed applications and specialized NASA applications, processes and tools which are integrated across commercial and open source architectures into cohesive computing environments.

These applications (with representative examples) can be categorized as follows:

- 1) COTS software, including for example—
 - a. Pro/Engineer Computer Aided Design package.
 - b. NASTRAN, PATRAN, Matlab, or similar engineering analysis software.
 - c. Integrated Enterprise Management Program (IEMP) software for core business management and administration functions, including SAP/Business Warehouse (BW) Reporting Tool, Contract Management Module (CMM), and P-Card
- 2) Non-COTS software not developed locally, including for example—
 - a. Agency Labor Distribution System (ALDS) under IEMP software for core business management and administration functions.
 - b. Office of the Chief Financial Officer (OCFO) systems such as Funds Control System (FCS), Program Management Tool (PMT), and Federal Personnel Payroll System (FPPS).
- 3) Software developed by or for LaRC and used in production mode, including for example—
 - a. Airspace Traffic Operations Simulation (ATOS)
 - b. AeroCompass data reduction software for processing wind tunnel test data and flight data.
 - c. Programmatic Budget Development (PT)/Planning, Programming, Budgeting and Execution Tools, e.g. Center Management & Operations Budget Tool (CMOBFT automates the gathering of the CMO budget details, shortfall requirements, and reduction scenarios by Project/organization.

Application services may be required as part of integrated support as described in Section 1, Introduction, or it can be an independent requirement. In the case of an independent requirement, the Contractor shall interface with other cognizant IT personnel to plan upgrades and resolve problems. Application management requirements include:

4.4.1. Application Maintenance, Upgrade, and Improvement

- a) Develop and maintain a configuration management system (consistent with section 4.1.1) to include the following:
 - Current software versions
 - Status of planned upgrades
 - License information

- Software maintenance status
 - Locations of source code and documentation
 - Issue/bug tracking
- b) Optimize the execution of the application. Monitor the application for anomalies and respond to customer trouble reports. Analyze problems, interface with cognizant IT personnel if necessary to resolve problems. Implement and record corrective action.
 - c) Plan for and recommend evolution of the application. For example, advise the Government on applicability of upgrades and recommend possible software solutions to identified user requirements.
 - d) For COTS and non-locally developed applications, actively monitor availability of patches and upgrades. Evaluate upgrades, recommend schedule for upgrade, and inform customers of impact of upgrade.
 - e) Interface with software vendors to obtain patches and upgrades. Procure software updates and upgrades from the vendor (if required in individual task assignments). Install patches as required to ensure that application remains current, secure, and reliable. Install upgrades according to schedule approved by the Government. Interface with cognizant IT personnel as necessary to ensure smooth upgrade. Perform upgrades with minimal impact to users and notify users of interruptions in application.
 - f) Maintain software developed by or for LaRC. In general, the Contractor shall follow the maintenance process defined in IEEE/EIA Standard 12207, Systems and Software Engineering - Software Life Cycle Processes; however, the processes shall be tailored to the particular software package and applied with a rigor consistent with the software control class. Maintenance process requirements for the various classes of software will be further defined in a TA to be issued at TO start.
 - g) Advise customers on effective use of the software.
 - h) Develop a thorough understanding of the objectives of the agency IT security policies in order to implement these security measures for unique hardware and software needed to accomplish mission requirements and be in compliance with Agency and Government policies and mandates.
 - i) Ensure all applications are tested using a commercial testing tool for IT Security related security vulnerabilities prior to going into production as well as regularly throughout the application life cycle.
 - j) Work with local IT Security team and system ownership to ensure that all proper safeguards have been implemented and documented in the IT Security plan for the system housing the application.

4.4.2. Documentation

- a) For COTS and non-locally developed software, maintain and make available a library of application documentation via a web-based library.
- b) For software developed by or for LaRC as identified under Subsection 4.4.1 (f), deliver a Maintenance Plan within two weeks of receiving the TA. The Maintenance Plan shall document the level of maintenance to be performed; how problems and/or modifications are identified, classified, prioritized, tracked, and analyzed; and the approval, implementation, and test process to be used.

4.5. Database Administration

Database administration (DBA) as defined in this section shall be provided for those task assignments identifying a database management system (DBMS) environment, including DBMS software and associated database tools. Database administration requirements include:

4.5.1. Installation of Database Software and Tools

- a) Utilize the Center's Central Web and Database Servers as the default condition. Provide written justification when the requirements prohibit the use of the central services.
- b) Install and maintain new and upgraded DBMS software and associated tools on both production and development systems. Identify impacts of new and upgraded software by testing, documenting, and communicating impacts to customers, IT Security, network services, and the Center IT Operations Board before implementation.
- c) Ensure operability of the DBMS environment. Achieve and document a common or standard configuration for the DBMS environment to enable application developers to efficiently produce predictable results.
- d) Ensure compatibility between the DBMS and the operating system and interact with cognizant IT personnel to ensure that the system adequately supports database applications.

4.5.2. Monitoring and Configuring Database Engine and Tools

- a) Monitor activity of the database engine to determine efficiency of the database engine and applications. Manage disk space allocations, perform consistency checking, and monitor logical/recovery logs as well as notify network services of any impact to the network or related services.
- b) Based on the configuration of the file server and the existing and projected database workload, configure the database engine to optimize performance of database applications while minimizing effects on the rest of the file-server workload.
- c) Analyze the database workload and storage needs and plan for growth for databases and applications. Make determinations of DBMS software to support these needs, and communicate hardware/system software requirements to system administrator. Implement recommendations upon Government approval.
- d) Monitor use of the licenses for the database engines and related tools and provide report to government. Communicate with vendors and the Government to develop software maintenance strategies and maintain current licenses. . If the database is an Oracle database, all licenses must be coordinated with the OCIO through the Agency License Management representative.
- e) Provide solutions for allowing connections to the database engines from other platforms while following appropriate IT Security concerns. These solutions will include the use of ODBC (open database connectivity) and database client tools. Provide user training in the installation and configuration of these connections as needed.
- f) Ensure that all updates and patches are current in accordance with the Agency guidance and IT Security

4.5.3. Archiving and Restoring

- a) Archive and restore the database instance and logical logs, and provide input into system disaster/recovery plan to ensure restoration of database. Restore data as required.

- b) Create a test plan and perform periodic tests (at least every 6 months) to ensure that hardware, software, and processes will function as required to support archiving and restoring of data and to verify the disaster/recovery plan. Document all results in the CMS.

4.5.4. Security of databases and instances

- a) Maintain security of databases by managing access and passwords in compliance with NPR 2810.1A and DBMS application-specific requirements.
- b) Assist developers with managing access privileges to tables, stored procedures and other areas of the database.
- c) Periodically (at least weekly) audit logs to identify potential security breaches. Notify IT Security of any and all suspected inappropriate activity.

4.5.5. Documentation

Fully document, deliver, and maintain documentation for the following:

- Current configuration of the database environment including site specific parameters and tools installed and their availability.
- Historical tracking of changes made to the DBMS environment over time.
- Operational procedures in the administration of the database environment
- Procedures to be used by end users using the database environment
- Database archive/restore strategy to be included in system disaster recovery plan

4.5.6. Resolution of Problems/Issues

- a) Provide troubleshooting skills to identify and solve problems/issues related to the database instance or related tools. Document these problems/issues and lessons.
- b) Interface with system administrator and application developers to develop solutions to problems and implement corrective action. Maintain trouble report tracking system to give status of problems and their resolution.

4.6. Customer Support

ODIN will provide help desk support for the Center as specified within a TA to be issued at TO start. The CONITS II contractor shall establish a signed formal agreement with the ODIN contractor to coordinate assignment, tracking, and resolution of ODIN help desk calls pertaining to systems and applications supported by CONITS II.

A basic level of customer support is required for all General IT Support Services to include:

- a) Consultation and assistance on basic use of equipment and applications.
- b) Efficient mechanism for communication between customer and IT support staff.
- c) Prompt response (within 2 hours) to user problems. Two hours commences when the call is received by the CONITS II contractor.
- d) Provide and use an electronic customer request tracking system to give the current status of requests or problems and their resolution.
- e) Interface with system administrators, system security administrators, database administrators, and other application administrators as necessary to resolve the problem for the customer.

Other customer support activities such as help desk, training, and end-user documentation will be specified in task assignments.

4.7. Consultation and Training

The Contractor shall provide technical support, consulting, and coordination to ensure orderly system implementation, integration, and operation of all systems, systems software, and application software identified in task assignments. Additional consulting requirements may be identified in task assignments and include, but are not limited to:

- a) Assist the Government in defining data and information requirements, data sources, and intended end-user applications, and recommend appropriate information technology, products, and capabilities for satisfying information requirements.
- b) Design, develop, and revise training materials for systems and applications relevant to CONITS II Task Order. Schedule classes, arrange logistics for classes, conduct training, validate training effectiveness, and provide information for input to student records.
- c) Perform studies analyzing new technologies, analyzing feasibility of technical approaches, defining user requirements, analyzing existing environments, identifying constraints, deriving and analyzing alternative solutions, recommending approaches and solutions, and estimating costs and benefits.
- d) Advise on internal programs/projects which require financial information access and delivery solutions.
- e) Partner with the NASA Langley (LaRC) OCFO to deliver new solutions and capabilities.
- f) Participate in cross-business initiatives that deliver analytical solutions and define the next generation of financial analytics
- g) Ad-hoc financial system/user issue resolution.

4.8. Project Management Support

Provide project management support in accordance with NPR 7120.5. Supporting the process that enables LaRC to manage requirements and focus on risk (i.e., cost, schedule, technical) throughout the different life cycle phases of a project to achieve a specific goal. Ability to develop a work breakdown structure, project task planning and scheduling, managing of resources, providing risk management support, engaging earned value management and configuration management. Provide support on maintenance/upgrades of existing tools/processes and the development of new tool/processes. Provide Business Readiness Support by providing communications and methodologies used to facilitate culture changes caused by business process re-engineering and/or organization-wide service/technology implementations.

As NASA takes on projects, it is often common for the contractor to mirror the civil servant workforce in the area of project management. Examples:

Contractor project manager, Contractor process manager, Contractor conversion manager, etc. Ability to efficiently use the project tool team selected by LaRC, which currently is Microsoft Project.

5. SYSTEM AND APPLICATION DEVELOPMENT SERVICES

Services in this category involve the development of new software or the modification of existing software to change or add to its functionality. Modifications to correct faults, improve performance or other attributes, or to adapt to a changed environment, are considered maintenance and are covered in Section 4 of this SOW. Requirements for system and application development services will be specified in TAs. They will include but will not be limited to the following:

- a) Design and development of new software packages to meet specified requirements.

- b) Design, development, and/or integration of new systems integrated from hardware, commercial software, and newly developed applications.
- c) Development and integration of software applications within existing system environments; for example, a database application developed on central database servers.
- d) Modifications to existing software to change or add to its functionality.
- e) Software support to research and/or development projects that involve the continuing evolution of specialized algorithms and techniques.

5.1. Work Requirements

In the planning and execution of the work as specified in the TA, the Contractor shall undertake any or all of the following activities:

- a) Requirements Analysis and Planning: Analyze requirements to determine the feasibility of providing the desired software, target computer system, computer programs, results, documentation or other deliverables.
- b) Software Requirements: Document the conditions and capabilities that must be met or possessed by the product (the design to requirements).
- c) System Integration: Integrate equipment, software, communications, and processes to develop and deploy a new system or IT capability, including procurement of hardware and software if required.
- d) Software Design and Development: Design, develop, and test software to meet specified technical and quality requirements.
- e) Software Modification: Modify existing software in order to change or add to its functionality.
- f) Quality Assurance and Software Testing: Perform software quality assurance, prepare test plans, perform software acceptance testing, and document test results.
- g) Planning for Installation, Operations, or Maintenance Services: Prepare plans for these activities to follow systems or applications delivery.
- h) Documentation: Develop or update documentation such as user manuals, reference manuals, requirements documents, design documents, and test plans using either online or hard copy format.
- i) Problem Analysis: Perform independent analysis of mathematical, logical, system approaches and perform comparison studies of competing techniques to solve problems.
- j) Process Improvement: Collect and analyze process and product metrics. Identify, evaluate, and implement promising new processes, procedures, and technologies to improve software engineering capability, productivity, and quality.

5.2. Process Requirements

System and Application Development Services will be initiated through the issuance of a TA that will define the specifics of the software project. Project title, name of the LaRC software manager, software class (defined by the Government either as minimal, low, high or critical or as software Class A, B, C, D, E), functions and products required by the designated software class, description of requirements, constraints, and joint review schedules will be included in the TA. Life-cycle requirements, development approach, risk assessment, role of Contractor and Government personnel in a cooperative effort, acceptance criteria, the extent of contractor involvement

in acceptance testing, documentation, deliverables, and delivery schedules will also be specified as appropriate.

In general, the Contractor shall comply with the processes in IEEE/EIA Standard 12207, Systems and Software Engineering - Software Life Cycle Processes, augmented with requirements from software-related Langley Management System Center Procedures; NPR 7150.2, NASA Software Engineering Requirements; NASA-STD-8739.8: Software Assurance Standard; and NASA-STD-8719.13B: Software Safety Standard. However, processes shall be tailored to the specific project and applied with a rigor consistent with the software class and safety criticality. Life-cycle process requirements for the various classes of software will be further defined in a TA to be issued at TO start. (Some agency projects may write a comprehensive SPMP for the project and the contractor may be tasked to produce software products in accordance with that SPMP)

For each project, the Contractor shall prepare and maintain a Software Project Management Plan (SPMP), as tailored to the specific project and applied with a rigor consistent with the software class. SPMP requirements for the various classes of software will be further defined in a TA to be issued at TO start.

Certain Task Assignments may involve software development for human-rated software systems, non-human space rated software systems, or mission support software that would require the Contractor to be rated at Capability Maturity Model – Integration (CMMI®) for Development Capability Level 2 or higher.

5.3. Information Systems Development

The Center is continuing to develop the LaRC Business Application Information Architecture, that is, a framework within which business information management systems shall be designed. No databases development shall be performed in legacy database application environments, and any modifications to legacy databases shall include conversion to the LaRC business application information architecture. The architecture relies on standards and configuration control to provide interoperability between databases, reduce the development of unique or duplicative systems, permit focus and skill-building among the technical and consumer work force, and reduce application specific training required by end users.

The Business Application Information Architecture technical environment consists of a suite of tools and database management systems which support the standards selected for use. Current tools include:

- Operating Systems
 - Solaris
 - Linux
 - Windows
- Web Server
 - Apache
 - I-Planet
- Database Management
 - Oracle
 - MySQL
- Open Source Scripting Code

- Perl
- PHP
- .NET

Research oriented tasks may not use the standard architecture as described. Exceptions to the standard architecture will be specified in the TA and must have requirements that would not allow it to be housed in the Center's Central Web and Database environment.

6. WORK-AREA SPECIFIC SERVICES

The effort to be provided under this Task Order shall be in support of, but not limited to, the work areas of the LaRC IT environment described in this section.

As stated in Section 3, task assignments will be issued to specify required services. These services may include any or all of the general support requirements given in Section 4 and software development requirements given in Section 5, but also may include requirements that are specific to a work area. In addition to a brief description of each work area, specific requirements are listed that are representative but not all-inclusive of that work area.

Reference to "integrated support" of a system or systems encompasses all activities necessary to develop, deploy, upgrade, operate, and maintain a production IT capability.

Many of these work areas require services involving the operation of hardware and software systems to produce data; reports; or business, scientific, or engineering solutions. If this is the case a TA will require that the Contractor develop an "Operations Plan," defining the procedures for receiving requests; prioritizing, approving, scheduling, and executing work, and delivering products.

In general, in the event that software developed by or for the Government is to be operated, such a plan shall comply with the operations process of Section 5.4 of IEEE/EIA Standard 12207-Software Life Cycle Processes; however, it shall be tailored to the particular software package and applied with a rigor consistent with the software control class. Operations process requirements for the various classes of software will be further defined in a TA to be issued at TO start.

6.1. Centralized Web and Database Servers

The Central Web and Database Servers are designed to meet the general server computing needs of the Center. They are provided by the OCIO as a way to more efficiently, effectively, and securely meet the needs of the Center. The OCIO provides these services to NASA and the NASA LaRC community. The environment used to support these services consists of a heterogeneous network of Unix, Linux, and Windows. Onsite system administration is required to maintain resource availability and IT security for NASA personnel, contractor, and temporary employees, within and outside the LaRC domain. Central web servers and products on those servers are available to all LaRC personnel for web site hosting and web development activities, which promote and support LaRC teams, organizations, and programs. Several web technology products are available on the centralized web servers including web server software, web application development software, a search engine, site usage analysis tools, and Secure Socket Layer (SSL) capability. Requirements specific to this work area include:

- Provide integrated support for central web servers including system administration, performance and security monitoring, daily backup, log monitoring and archival, and monthly access reports.
- Provide for all hosted web sites a unique virtual server name, a dedicated IP address, disk space for site development, and monthly report of site activity.

- Respond to problems and questions directly related to web software residing on the central servers and monitor sites and servers for any problems that interrupt services or compromise security. Collaborate with the network services team as well as the IT Security team to ensure all requirements are met and that no adverse impact to the network is experienced.

The environment generally consists of the following:

Operating Systems:

- Windows
- Linux
- Solaris

Web Servers:

- Apache
- I-Planet

Databases:

- Oracle
- MySQL

Scripting Language Support:

- PHP
- Perl
- .NET

Search Capabilities:

- Google Search Appliance

Web Usage Statistics:

- WebTrends

Other applications and user tools that assist in the operation and maintenance of the environment are also used.

6.2. LaRC Technical Library

The OCIO provides services to NASA Langley Research Center and other NASA centers. The LaRC IMB operates a number of integrated hardware-software systems consisting of commercial-of-shelf (COTS) applications, LaRC developed applications and commercial information products. These products and applications are used by the LaRC OCIO staff to provide information management services and by the LaRC community in accessing information related to research and overall information needs. These systems include NASA GALAXIE, a NASA-wide library management system containing bibliographic information on the holdings for all NASA libraries and providing modules for managing and automating circulation, acquisitions, authority, cataloging, serials check-ins, materials requests and other library tasks. Other systems include web servers, technical report servers, such as DSpace and TPSAS, interlibrary loan systems such as ILLIAD, and specialized database servers for Metalib, SFX and Refworks. New electronic information products are emerging rapidly and the OCIO is continuously evaluating and planning for these new products. Services shall include system administration, IT security administration,

application management, database administration, customer support, IT consultation and training to the OCIO in order to support the LaRC community and other NASA centers as specified. Requirements specific to this work area include:

- Provide integrated support for NASA GALAXIE system and provide customer support to staff in all NASA libraries in the form of telephone support, staff training, documentation, and meetings with users.
- Provide integrated support for all other library systems. Install, update, and maintain electronic databases received on CD-ROM, diskette, or computer tape on servers networked within the library and LaRC.
- Operate, maintain, and enhance digital library applications running on technical report servers.
- Perform database administration and maintain and enhance database applications.
- Provide library with input as to maintenance needs of the various systems, needed system upgrades, changes in system technology.
- Consult with library staff on provided new digital information services.

6.3. Database Servers

A central database architecture is part of the Central Web and Database Servers available for the development of applications by LaRC teams, organizations, and programs. The central environment can be used to develop applications to be hosted on central database servers or on customers' own systems. The OCIO is responsible for providing and managing software, tools and administration of database systems and for supporting NASA and the NASA Langley Research Center (LaRC) community requirements and initiatives. Data modeling and database design are currently areas that OCIO supports as well as the following:

- Provide integrated support for central database servers including database administration.
- Administer Oracle and MySQL licenses and licenses for associated database development tools. License management is provided by the Government.
- Provide a central environment for database application development.

6.4. Large Scale Data Storage and Retrieval System

The Contractor shall support the Central Storage System (CSS). The CSS provides large scale, network-accessible storage for LaRC, other NASA Centers, and their approved contractors. CSS is the next generation of the Distributed Mass Storage System (DMSS). CSS uses a Hierarchical Storage Management (HSM) approach with three levels in its storage hierarchies: disk, primary copy tape and secondary tape. The current configuration consists of Fibre-Channel disk array systems and a StorageTek Automated Cartridge System with T10K and 9940 tape technologies. The HSM software used is IBM's High Performance Storage System (HPSS). CSS is managed by the OCIO. This system is used by users at LaRC and other NASA centers to:

- (1) archive data;
- (2) temporarily store large data files for near-term computation needs;
- (3) store data for scientific and business information systems
- (4) archive shared data for projects; and
- (5) backup systems

Requirements specific to this work area include providing quality round-the-clock data storage and retrieval services to individual users and IT services. The Contractor shall ensure the security of the stored data by maintaining highly disciplined control and monitoring of the physical and software accesses of data as well as the environmental factors required of the tape technologies for data integrity. These services will be required to perform user-transparent migration of data prompted by hardware and software technology upgrades. Additionally, the Contractor shall address new user or project data requirements and Government's IT infrastructure requirements, and evaluate mass storage systems and technologies and the interface of mass storage systems to other IT technologies.

6.5. LaRC IT Security Manager Support

The Contractor shall support the LaRC Information Technology (IT) Security Manager (ITSM) or Designee to implement the IT Security (ITS) Program at LaRC in accordance with NPR 2810.1A, Security of Information Technology (see the following URL: <http://nodis.hq.nasa.gov>). The ITSM's role is to develop Center-wide IT security policies and guidance, to provide computer awareness and training, to maintain an incident response capability, and to document, review, and report the status of the Center IT Security Program. The Contractor shall provide NASA Langley Research Center with an incident response and computer forensics capability; intrusion detection and monitoring capability; remote access compliance; assistance with ITS planning; coordination of ITS activities with other Centers; perimeter protection, to include a Virtual Private Network (VPN) and firewall; and outreach. They shall also provide system administration support for the systems that support the ITSM's role, including the Langley Registration Authority (RA) for the NASA LaRC Public Key Infrastructure (PKI) at NASA LaRC as part of the IT Security initiative.

6.6. Software Engineering Process Group (SEPG)

Software Engineering Process Group support includes the definition, implementation, and continuous improvement of complete software development lifecycle processes and procedures for LaRC as a whole, individual LaRC organizations, and projects. The primary focus of this area is to support LaRC organizations with implementing LaRC's Software Process Improvement Initiative, the software related Langley Management System Center Procedures, NASA software related NPRs and standards, and the process areas of the Software Engineering Institute's Capability Maturity Model–Integration (CMMI). Requirements specific to this work area include:

- Assist in the development and improvement of software related Langley Management System Center Procedures that comply with NPR 7150.2 NASA Software Engineering Requirements and its associated standards (e.g., NASA-STD-8739.8: NASA Software Assurance Standard, NASA-STD-8719.13: Software Safety Standard) and CMMI to improve software engineering capabilities at LaRC.
- Review various Langley Management System documents for proper integration with software related Langley Management System Center Procedures.
- Analyze and create products to help in understanding, implementing, and complying with projects, systems, and software related NASA Procedural Requirements (NPRs) and Standards.
- Develop and provide training on software related Langley Management System Center Procedures and process areas of CMMI.
- Develop examples, templates, checklists, and other artifacts to aid in training and implementing software related Langley Management System Center Procedures.
- Evaluate, implement, and aid others in the use of current and new software technologies, methods, processes, and procedures.

- Collect and provide analysis on software process, procedure, and product metrics to improve software reliability, productivity, quality, and system performance.
- Develop software requirements, design, code, and test products.
- Assist LaRC Organizations and projects in the efficient implementation of software related to Langley Management System Center Procedures, plans, processes, NPRs and NASA Standards.
- Assist LaRC Organizations and projects in the efficient implementation of the Process Areas of the CMMI and in preparing for, scheduling, and successfully obtaining CMMI appraisal ratings.
- Maintain records of LaRC CMMI events and accomplishments.
- Collect and analyze LaRC software inventory data.
- Provide process and product software quality assurance for LaRC Organizations and projects.
- Perform Software Assurance Classification Assessments.
- Coordinate and facilitate the delivery of software engineering training for LaRC from various providers and maintain training metrics, class titles and dates, and attendee's lists.
- Develop and maintain the LaRC Software Process Improvement Initiative web site.
- Provide configuration management of all SEPG products.
- Provide schedule analyst and status tracking support for the SEPG activities.
- Assist in preparing semiannual reports on SEPG activities and accomplishments.

6.7. Integrated Design Center Support

The IDC is a multimedia, collaborative engineering facility with sophisticated tools and collaborative process support for projects in all phases of design, from concept to flight. The facility is used to locate design teams in one place for real-time design development in an integrated environment. In order to support the IDC, the CONITS II contractor shall provide expertise to maintain the integrated computing environment with all the standard tools needed for collaboration and multidisciplinary analysis using 3D geometry and physics-based modeling along with the audio-visual equipment for simultaneous projection and networked hardware such as file servers, data storage systems, and PC workstations.

6.8. Surface Modeling and Grid Generation

Surface modeling and grid generation support includes the production of accurate surface definitions and numerical grids for Computational Fluid Dynamics (CFD), Computational Structural Mechanics (CSM), and other engineering analyses. This work is centered in the Geometry Laboratory (GEOLAB). Requirements specific to this work area include:

- Provide integrated support for the GEOLAB systems.
- Create and modify numerical surface models to be compatible with software tools using multi-block structured or unstructured grid generation techniques using computer aided design software systems.
- Generate numerical grids compatible with analysis software and geometry.

- Analyze grid quality and validate surface modeling and grid generation integrity.
- Incorporate surface model measurements acquired using digital scanners into surface models.
- Develop software and user interfaces to integrate use of geometry tools.
- Provide consultation services in the areas of structured and unstructured grid generation and geometry modeling.

6.9. Data Visualization and Image Processing

Data visualization support involves the development and application of data analysis and visualization tools and techniques for a wide variety of disciplines including Computational Fluid Dynamics, Computational Structures, atmospheric modeling, remote sensing, and experimental fluid dynamics. This work is primarily in support of the Data Visualization and Analysis Laboratory (DVAL). Requirements specific to this work area include:

- Provide integrated support for the DVAL systems.
- Generate static and dynamic visualizations from experimental and computational data sets.
- Process and analyze large sequences of video images.
- Apply collaborative virtual environments technology to specific research problems.
- Develop custom software applications with sophisticated graphical user interfaces.
- Apply feature extraction techniques to complex, multivariate data sets.
- Consult on methods for the comparative visualization of simulated and observed results.

6.10. World Wide Web Application Support

WWW support is focused on application development activities at LaRC. The term “WWW application” refers to software products that include a World Wide Web browser as their user interface. Typical WWW applications are comprised of static or dynamically generated code in Hypertext Markup Language (HTML), often include executable components and sometimes include connectivity to databases. Requirements specific to this work area include:

- Develop WWW applications including web page interface design.
- Develop code and data reuse repositories.

6.11. Data Management Support

Data management support includes information management applications, Database Management System (DBMS) support, data modeling, knowledge management system support, and program integration. Requirements specific to this work area include:

- Develop and maintain web-based information management systems for scientific and administrative data management including data model, graphical user interface, and database interface development.
- Evaluate, design, and/or implement information management technologies.
- Evaluate and apply database connectivity tools, database standards, and data format standards to data management applications.
- Provide administration of database management systems such as, but not limited to, MySQL and Oracle and application server software.

- Incorporate knowledge management with software agents that provide specific data services and can in turn invoke other software agents.

6.12. High Performance Computing and Distributed Systems

LaRC is currently involved in many high performance computing programs and projects. The systems that these activities require are current, state-of-the-art computing systems that utilize a variety of computer hardware, operating systems, and applications codes. The major requirements for the support of high performance computing specific to this work area include:

- Provide expert consulting services on the application of high performance hardware and software solutions for Langley's programs and projects.
- Administer organizational level and center computer level systems used primarily for the production of engineering data where large numbers of processors, large memories, or extensive data management is required to meet LaRC engineering and scientific goals.
- Facilitate the development, debugging, performance analysis, and optimization of user and system wide applications.
- Develop performance metrics, benchmark, test, and evaluate new architectures and software to meet current and future needs.
- Administer LaRC parallel and clustered computational or application servers with state-of-the-art architectures.
- Support specialized libraries for system or software development for high performance computing architecture.
- Support specialized applications codes for use on high performance computing architecture.
- Develop unique solutions to isolate, eliminate or mitigate information technology centric problems in engineering and scientific applications.

In addition to the high performance computing requirements there are distributed systems consisting of clusters of networked computers and associated equipment, located at various sites throughout the Center, which are used in specific experimental or analytical environments. These clusters are generally used by small groups of researchers or engineers with particular specialties such as computational fluid dynamics, computational structures, engineering design and development, modeling and simulation, software development, and other IT intensive applications. Most work will be accomplished at LaRC; however, occasional travel will be required to support work in collaboration with other NASA centers, Government agencies, and industry.

The majority of the services required for distributed systems are systems administration, database administration, hardware and software maintenance, and applications management as described in Section 4. Services to be provided for applications programs include "Commercial-off-the Shelf" (COTS) as well as custom software developed by civil service personnel or other contractors. Support for this applications software may include only the distribution and installation of the applications package and upgrades (designated as software maintenance) or services all the way up to full technical support including software development, enhancements, and consultation. Some examples of COTS applications support requirements include support for Pro Engineer, Windchill, Matlab, LabView, NASTRAN, and Mechanica as well as locally generated software for engineering analysis, database management and knowledge management.

6.13. Data Reduction

Data reduction programming and analysis support is required at LaRC by a wide variety of research facilities with research disciplines ranging from rotorcraft, low-speed aircraft to hypersonic spacecraft, dynamic flight testing, and structural analysis and materials research in static laboratory testing. A significant portion of this support includes the development of utility and application interfaces such as Graphical User Interfaces (GUI) code or control software, using COTS packages such as Sherill-Lubinski Graphics Modeling System (SL-GMS) or LabView. The development may also include data acquisition software and translators for information exchange between heterogeneous platforms and other IT intensive applications. The extent of the application management support for the existing and newly developed applications may range from installation only to full support involving additional software or script development, code enhancements, execution of the application, generation of required products, and consultation. Requirements specific to this work area include:

- Algorithm and code development in computer languages including but not limited, to FORTRAN, C, C++, Java and Visual Basic
- Application management of legacy codes
- Execution of data acquisition, analysis and presentation applications based on Government's test and data presentation requirements, and the delivery of products
- Performing data distribution and data archival

6.14. Geographic Information Systems

Geographic Information System (GIS) is an intuitive spatial data management and decision support tool. Institutional managers are the current primary users of data and processes, but use of the technology by researchers is on the rise. The spatial information management system is built around a relational database consisting of data that includes or is derived from such records as: aerial photographs, topographic maps, descriptions and engineering drawings of buildings and facilities, utility plats, geological data, climatic records, financial data, and personnel locator records. The location of objects such as buildings - or even individual offices - is given with high accuracy in coordinates derived from the satellite-based Global Positioning System (GPS). GIS at LaRC strives to integrate functions such as Master Plan, Real Property, Space Utilization, Facility Maintenance and Operations. To increase accuracy and sustainability of data. Support is often provided at remote sites.

The database can be interactively queried through web pages to extract up-to-date maps or plans restricted to selected features or to produce reports relating selected data. Examples are: maps depicting the effects of flooding correlated to tidal stages; maps and reports detailing utility systems; maps and reports in support of master planning (e.g. land use, security, emergency evacuation, traffic flow, parking, landscaping and environmental monitoring); and reports on space utilization (e.g., office occupancy densities for both contract and civil service personnel, and associated full cost accounting for facilities). Automated space allocation optimization is an area where spatial data technologies are being applied to increase overall efficiency and effectiveness. Other information can be extracted from the available data on a case-by-case basis.

Requirements specific to this work area include:

- Provide integrated support of the GIS systems
- Update and enhance GIS databases

- Provide field observation, network solution, equipment readiness, and report generation in support of GPS data gathering and use. Proficiency in use and application of high accuracy GPS equipment, and 3D laser scanning systems is required.
- Develop and enhance software products for the display, maintenance, and publication of building spatial data and Master Plan related data.
- Develop new software tools and maintain existing tools to support the activities of the GIS using .NET and ArcGIS Server technologies..

6.15. Computational Analysis and Programming Services for Research and Flight Projects

This activity includes the mathematical modeling of physical systems; development of real-time embedded systems; 3D graphical scene generation; the determination of computational techniques and algorithms for the solution of the resulting mathematical problems on appropriate computer systems; and the development or adaptation of computer codes to implement the solution process. Mission software may be required for LaRC programs and projects such as the Aviation System Capacity Program, the Clouds and the Earth's Radiant Energy System (CERES) Project, the Airspace Systems Program, and the Aviation Safety Program. Requirements specific to this work area include:

- Establish data management systems, graphical interfaces, and software for combining computer programs to provide for integrated analyses of multidisciplinary research projects.
- Develop embedded flight software systems to provide real-time instrument control and data acquisition.
- Develop ground computer software systems to support instrument development, test, calibration, commanding, and simulation.
- Develop, test, and maintain ground computer software systems that enable flight deck-based, airspace and Air Traffic Management (ATM) simulation systems and research.
- Develop software procedures for the integration and test of a flight experiment with its spacecraft or airframe platform. On-site diagnostic support for comprehensive performance tests that involve the operational behavior of the flight experiment and its attendant flight software and ground systems.
- Write and maintain project documentation for software systems. Programming languages required include, but are not limited to, FORTRAN, C, C++, Java, JavaScript, and Perl.

6.16. Central Computer Facility Environmental Monitoring

The 1268 building complex is comprised of numerous heating, ventilation, air conditioning, mechanical, and electrical systems that are essential to supporting a wide variety of research and Information Technology functions for LaRC. Due to the complexity and potential failure of these systems it is essential that continual monitoring of the facility be provided. Also, as result of additions, changes, or deletions to the facility systems and changes in office and equipment areas, there is a frequent need for maintaining current facility drawing and configuration files. Requirements specific to this area include:

- Provide system administration support for all systems required to monitor and control the 1268 building complex HVAC systems.
- Monitor and Maintain Facility and LaRC communication Closet UPS (Uninterruptible Power Supply) systems.

- Provide facility configuration and layout documentation and drawings
- Provide system administration support to ascertain that the 1268 building complex is in compliance with LaRC Center and Federal electronic and physical security plans.

Aperture CAD software is used for facility drawings, Siemens Insight HVAC software is used for environmental control, and APC Infrastructure Management System and MGE Monitor Pack software is used for UPS monitoring. Both hardware and software elements are associated with these systems to insure proper and reliable operations.

6.17. Administrative Business Applications/Support

Provide leadership, advice, and oversight for all administrative business applications and support (including implementation, operations, improvement, and information delivery). Provide expert financial system directions, management, analysis, and advice. Work products should ensure timely, consistent, reliable, and accurate information and reporting. Collaborate across internal and external organizations to maintain effective relationships and enable synergy. Delivery of productions should be consistent, effective, and measurable to ensure efficiencies. Services provided should include but not limited to:

- Provide technical support of the IEMP modules that are in production. This support is centered around three (3) key areas: providing desktop support for non-ODIN supported PC and Macintoshes, providing SAP printer support, and coordinating Agency-level tasks. Additional activities will be identified in a CONITS II Task Order.
- Provide security administration support for IEMP modules in production.
- Provide information delivery (report) support. Provide process knowledge to support end-users with existing reports, as well as, design and develop additional reports or queries as requested.
- Provide support to the Office of Procurement by the following, but not limited to (additional activities will be identified in a CONITS II Task Order).
- Provide bankcard (credit card) validation between SAP and the P-Card application.
- Provide support to the OCFO by the following but not limited to (additional activities will be identified in a CONITS II Task Order)
- Provide support in evaluating financial management policies, processes, and controls at the Center, and provide recommendations for improvement in the areas reviewed.
- Provide day-to-day administrative support to CFO, Resource Management, Financial Management and to the project teams.
- Provide scheduling support to the Center Implementation Project Manager (CIPM) and to the Center Business Process Lead (CBPL) when necessary.
- Provide monthly Cost Assessment support.
- Create, advise on, or maintain processes that contribute to and monitor the health of financial information and the underlying financial systems.
- Ensure data quality is maintained throughout the key business systems and applications.
- Provide support to the Center Business Process Leads of Finance, Procurement, Human Resources, and other future IEMP modules.

6.18. Airspace and Traffic Operations Simulation (ATOS) Development and Enhancements

The objective of this activity is to develop and enhance NASA-Langley Research Center's (NASA-LaRC) Airspace and Traffic Operations Simulation, including methodologies to enable research experiments in support of future air transportation system concepts and technologies such as those currently being explored by NASA's Airspace Systems Program projects (NextGen Airspace and NextGen Airportal). Research and development tasks will explore new methodologies for the development and enhancement of distributed airborne simulation tools, design and develop new engineering models of revolutionary and enabling airborne technologies, integrate these new simulation tools and engineering models into the ATOS, and aid in the conduct of simulations (including experiment design, data analysis, and reporting). The overarching goal is to produce and maintain an integrated, operational, and productive Air Traffic Management (ATM) research tool that also incorporates capabilities for transitioning to simulations of airport surface operations.

Numerous research goals will be met through studies and experiments conducted using the ATOS (hosted in the Air Traffic Operations Lab, or ATOL, at LaRC) as well as with other simulation tools that may be linked to the ATOS for specific experiments. These research goals, many of which require capabilities not found in current facilities, include (but are not limited to) the following: (1) evaluating the impact of uncertainties, real-world system behaviors, weather, and human factors on the safety and performance of airborne trajectory management applications; (2) developing new 4D dynamic Required Navigation Performance (RNP) capabilities and determining how they may affect the performance of various airborne applications integrated with ground-based operations; (3) creating new metrics for dynamic airspace complexity and evaluating the effects of various distributed complexity-mitigation functions and en-route coordination strategies; and (4) evaluating different algorithms and procedures for super-density terminal area merging and spacing applications. In the area of airport surface operations, research goals include: (1) evaluating Collision Avoidance for Airport Traffic (CAAT) algorithms in the low altitude, runway, and taxiway operating environment; (2) evaluating integrated aircraft-based CAAT and ground-based taxi conformance monitoring and longer term collision detection and resolutions solutions; and (3) developing and evaluating algorithms and procedures to maximize airport arrival and departure capacity, including reduced in-trail separation requirements, closely-spaced and converging/intersecting runway operations, and runway balancing.

Development, implementation, and integration of new simulation capabilities will be required to perform vital studies and experiments in support of planned research goals. These simulation capabilities generally fall into the following categories: (1) development of engineering models of advanced technologies that enable new concepts of operation, such as airborne four-dimensional (4D) trajectory & separation management, terminal area merging and spacing, and in-trail procedures (oceanic and domestic) for enroute climbs and descents; (2) new 4D trajectory generation capability for the on-board flight management computer (FMC), including a common lexicon for the exchange of 4D trajectory data between various airborne and ground-based systems and applications; (3) advancements in the simulation of the basic aircraft, including airframe and engine performance models and control laws; (4) improvements to fundamental simulation control functions, including timing, mode transitions, and scenarios, that support the full range of experiment types from real-time human-in-the-loop studies to large-scale batch runs; and (5) evaluation of algorithms and procedures for airport arrival and departure operations.

Requirements specific to this work area include:

- Develop, test, and integrate software modifications, within and across ATOS subsystems, required to meet simulation capability and experiment needs for ongoing research;

- Provide enhancements to adapt to evolving research requirements;
- Determine best experimental methodologies for posed research questions;
- Aid in the conduct of simulations (including experiment design, data analysis, and reporting).
- Develop enabling technology (engineering) models of advanced airborne technologies supporting trajectory planning and guidance;
- Determine appropriate level of modeling fidelity for each aspect of the ATOS' component subsystems, including but not limited to aircraft performance, CNS (Communication, Navigation and Surveillance) infrastructure, and the operating environment (including air traffic and airport surface scenarios);
- Support the exploration of large-scale effects of multi-aircraft interactions in the proposed NextGen concepts of operation, especially between aircraft of significantly different performance characteristics;
- Develop advanced traffic generation capabilities that include real-time background target generation for ATOS scenarios, fast-time stand-alone simulation capability for batch studies, tools for scenario design and prototyping, and data recording;
- Model typical pilot behaviors while interacting with new ATM research tools;
- Improve connectivity with other simulation tools and facilities;
- Provide functional description documentation for all software components;
- Document operating instructions.